

SCIENCE

And Technology Program



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FY 1999 - FY 2000

Reclamation's infrastructure is aging, with much of it now exceeding its original design life and suffering from physical deterioration. At the time of the design and construction, Reclamation's dams, powerplants, canals, and appurtenant structures used state-of-the-art materials engineering technology. However, just as new state-of-the-art earthquake and flood loading criteria were emerging for design, physical deterioration mechanisms affecting long-term durability were also being discovered. As these deterioration mechanisms were discovered, new materials and mixtures were formulated to prevent damage in newer structures. Unfortunately, we still have many structures that used older technology that need improvement and enhancement to remain viable Reclamation resources. In addition, new environmental regulations have forced the elimination of certain products that worked well, but posed some hazards. The search for new materials to replace these products is a critical component of any program to maintain, protect, and repair our infrastructure.

A coordinated program was developed to evaluate the newest repair and protection systems and materials. There has been a relative "explosion" of repair and protection systems and materials over the recent years to address problems with older infrastructure in the United States. Some of these new repair and protection systems and materials may provide cost effective improvements over our existing approved methods. Several key areas need to be investigated. Of primary importance to this program is to measure repair systems and materials properties using standardized testing methods and to monitor field performance of tested systems. Since the properties of the repair material affect the performance of the repair, matching the repair material to the anticipated service condition is critical. With that information, repair systems and materials can be matched to their anticipated service conditions, and effectiveness of repair systems and materials in different environments can be determined and compared.

We have: (1) prepared a report on the state-of-the-art use of shotcrete for concrete repair; (2) prepared a draft coatings inspection and repair manual for use by Reclamation forces; (3) drafted a report on the use of vacuum shrouded hydro-demolition techniques for safely removing hazardous and contaminated coatings and surfaces; and (4) identified and developed mixture proportions for new high performance concrete repair materials.

In addition, Reclamation is a Founding Member and sits on the Steering Committee of the newly formed Concrete Repair Engineering Experimental Program. The program is a partnership of the Bureau of Reclamation, Corps of Engineers, University of Laval, Structural Preservation Systems, Inc., and ConProCo Corp., and receives support from the American Concrete Institute and International Concrete Repair Institute. The program is a coordinated effort of public, private, and academic organizations to develop material properties and test procedures to predict the performance of thin repair materials, which have a very poor history of performance.

Bortak, Tom. October 1999. Coatings Inspection and Repair Guide, draft.

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